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TIME REQUIRED TO SOFTEN THE BONES OF VARIOUS FISHES BY CANNING IN PRESSURE COOKERS.

(From the report of the Commissioner of Fisheries for the fiscal year ended June 30, 1918, pages 35-37.)

Although preservation of fish in the home by canning affords an excellent opportunity for the increased saving of fish, the housewife has made little use of this method. With the development of small pressure cookers, purchasable at reasonable cost, it is possible for the housewife to process fish in the home, duplicating the work of the commercial canner. In this manner she may practice a measure of economy and provide a supply of palatable and nutritious food in seasons of the year when fish are abundant for use in period of scarcity.

The primary object of "processing" fish, or cooking them under steam pressure, is to sterilize them to prevent spoiling. An additional advantage of the method is that if the heating is continued for a sufficient length of time the organic matter in the bones is dissolved, leaving only a soft, friable mineral matter that can be eaten along with the meat. With the bones thus softened the fish is much more acceptable as food. Thus, small bony fishes that would otherwise be useless, or fishes of small market value, may be saved, and the larger staple fishes made more attractive.

The time required to soften the bones of fishes varies with the species, the size of the fish, and the pressure and temperature employed. In domestic canning, unless the required time is known, time and fuel may be wasted by overcooking, or by insufficient cooking the bones may not be properly softened.

A recent journal article calls attention to the small amounts of calcium present in most of the common foods and presents a table showing that comparatively large amounts of the ordinary foods are required to yield four-tenths gram of calcium oxide per day, which is about one-half the daily requirement of the average adult. The bones of fish, properly softened as they are by domestic or commercial canning, render available an abundant amount of calcium in acceptable form, not encountered in such amounts in any other common food. In addition to this they supply phosphoric acid and other valuable minerals. It is, therefore, not only good housekeeping, but good dietetics, to can fish for home use.

The bureau has conducted experiments to determine the time required to soften the bones of about 30 common marine and fresh-water fishes of different sizes. In the table which follows the time given is that determined experimentally for the sizes mentioned. It will be a simple matter to interpolate the time periods required to soften the bones of fishes of the same species but of sizes different from those represented. The term "softening" as here used means the point in cooking when the small bones, ribs, etc.,

(Over)

are soft, but when the large vertebrae are not yet sufficiently soft to be consumed along with the muscle. In some of the larger fishes whose large bones could be scarcely eaten, even if they were softened, it would appear to be a waste of time and fuel to carry them to the point of complete cooking, and in such cases it ought to be sufficient to soften the small bones and sterilize the contents of the can. For such a purpose the "softening" rather than the "soft" point may be used.

These experiments refer to fish cooked in Mason jars of quart size, The time periods are measured from the point when the given pressure and temperature are reached (at the top of the cooker) to the time when the heat is shut off. The heating-up and cooling-off periods of time are thus not included. The fish were salted, but no water was added. Samples of fish canned during the course of these experiments were kept six weeks at room temperature (about 68° F.) and were then incubated at 98° for 48 hours. All were sterile.

Time required to soften the bones of
various species of fish, 10 lbs. pressure, 240° F.

Species	Weight (lbs)	Softening (minutes)	Soft (minutes)
Black bass:			
Large	5-6	100	120
Small	3/4-1	100	110
Bluefish:			
Large	6-9	90	100
Small	1-2	80	90
Butterfish, medium,	¼-½	60	80
Carp:	8-12	110	120
Catfish:			
Large	1½-2	70	80
Small	¾	60	70
Cero, medium	10-13	80	90
Cod:			
Large	6-16	80	90
Small	1-2	50	60
Croaker:			
Large	3/4-1	90	100
Small	1/4-½	50	60
Eel:	2-3½	100	110

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